Zootaxa 4903 (2): 265–274
https://www.mapress.com/j/zt/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.4903.2.6
http://zoobank.org/urn:lsid:zoobank.org:pub:9A023CCF-C516-4648-B56C-A5A24283CCF9

Two new aphid species of the genus *Cryptomyzus* Oestlund, 1922 (Hemiptera, Aphididae) from Kazakhstan, and keys to apterous and alate viviparous females

RUSTEM KH. KADYRBEKOV
Institute of Zoology, Ministry of Education and Sciences, Republic of Kazakhstan, Academgorodok, Al-Farabi avenue, 93, Almaty, 050060, Kazakhstan.
rustem_aijan@mail.ru; rustem.kadyrbekov@zool.kz; https://orcid.org/0000-0003-0550-3697

Abstract

Two new species of the genus *Cryptomyzus* Oestlund, 1922 are described from Lamiaceae in the Kazakhstan part of West Tien Shan: *Cryptomyzus* (*Cryptomyzus*) *sairamugamicus* **sp. n.** living on *Phlomis salicifolia* and *C.* (*C.*) *karzhantavicus* **sp. n.** living on *Stachys betonicifolia.* Keys are provided for identification of apterous viviparous females and alate viviparous females of the world's fauna of the genus *Cryptomyzus*.

Key words: Hemiptera, Aphididae

Introduction

Cryptomyzus Oestlund is a Palaearctic genus, currently with 19 species in the world's fauna (Favret, 2019). It is divided into four subgenera: *Ampullosiphon* Heikinheimo (1 species), *Alataumyzus* Kadyrbekov (1 species), *Cryptomyzus* Oestlund (15 species), and *Phlomimyzus* Narzikulov & Daniyarova (2 species). Species of this genus with known life cycle either alternate between *Ribes* spp. and herbaceous plants of family Lamiaceae or live all year around on Lamiaceae (Blackman & Eastop, 2006).

Examination of materials collected in 2013 and 2014 in the Kazakhstan part of West Tien Shan revealed two *Cryptomyzus* species new to science, which are here described. As only regional accounts of this genus have hitherto been published (Guldemond, 1990; Hille Ris Lambers, 1953; Kadyrbekov, 1993; Blackman, 2010), comprehensive keys to distinguish apterous viviparous females and all known alate viviparous females are provided.

Materials and methods

Original microscope slides were prepared using coniferous balsam as mounting fluid (Kadyrbekov, 2014). The specimens were examined using a Bel Photonics light microscope. Aphid identifications were done with reference to authoritatively identified material from the collection of the Institute of Zoology of Ministry of Education and Sciences of Kazakhstan (Almaty). Holotypes and paratypes of newly described species are deposited in the collection of the Institute of Zoology (Almaty, Kazakhstan).

Keys were compiled with reference to keys to European species (Guldemond, 1990; Hille Ris Lambers, 1953), British species (Blackman, 2010) and species from Kazakhstan and adjacent regions (Kadyrbekov, 1993). Descriptions of *Cryptomyzus* species were also studied (Bozhko, 1961; Börner, 1952; Guldemond, 1990; Heikinheimo, 1955; Hille Ris Lambers, 1953, 1965; Kadyrbekov, 1993, 2000; Narzikulov & Daniyarova, 1979; Remaudière & Davatchi, 1961). All measurements are given in millimetres. Plant taxonomy follows POWO (2019).

Accepted by D. Ouvrard: 26 Nov. 2020; published: 7 Jan. 2021

Results

***Cryptomyzus sairamugamicus* sp. n.**
(Fig. 1, Table 1)

Type material. Holotype: apterous viviparous female, slide no 5027, South Kazakhstan, West Tien Shan, Sairam-Ugam natural park, Karzhantau gorge, Kyrykkyz pass, H- 1820 m a.s.l., *Phlomis salicifolia*, 8.08.2014, R. Kadyrbekov (Institute of Zoology, Almaty, Kazakhstan). Paratypes—2 alate viviparous females, 8 apterous viviparous females, same place and date; 11 apterous viviparous females, no 4731, South Kazakhstan, West Tien Shan, Sairam-Ugam natural park, Ugam gorge, Sairamsu ravine, 10 km to north-east from Kaskasu village, H- 1500 m a.s.l., *Phlomis salicifolia*, 7.07.2013, R. Kadyrbekov (Institute of Zoology, Almaty, Kazakhstan).

Etymology. The new species is named after Sairam-Ugam natural park, where it was collected.

Apterous viviparous female (from 10 specimens; for measurement see Table 1). In life: body white with green markings, eyes are reddish. On slide: body and appendages pale without dark parts apart from pale brown tarsi. Body is elliptic (fig. 1 a). The frontal groove is not deep. Its depth 0.12–0.17 of the distance between bases of antennae. Antennal tubercles are distinct and divergent. Median frontal tubercle is well-developed, quadrate (fig. 1a). Cephalic hairs are long, with thick bases, capitate. Antennae are six-segmented. The first antennal segment has a large protuberance on the inner side at apex and bears 4–5 hairs. Numbers of hairs on 2nd–6th antennal segments are II—3–4, III—6–10, IV—4–6, V—3–6, VI—5–6. Basal part of the 3rd antennal segment with 0–2 secondary rhinaria (fig. 1 b). Hairs on the 3rd antennal segment are short, slightly capitate. Rostrum reaches beyond the bases of the hind coxae. Its ultimate rostral segment is long, slender (fig. 1 c) and bears 4–5 accessory hairs. Siphunculi are slightly swollen, with small distinct flanges (fig. 1 e). Cauda is bluntly triangular or helmet-shaped (fig. 1 f). Dorsal hairs on the 2nd–5th abdominal tergites are capitate. Numbers of hairs on abdominal tergites: II–V—14–16, VIII—6–8. Marginal tubercles are absent. Genital plate is broadly oval, with 2 discal hairs and 6–8 posterior hairs. Legs are long (fig. 1 a). Hairs on the hind tibiae are capitate, 0.9–1.2 of its width at midlength. First tarsal segments with 3:3:3 setae.

Alate viviparous female (from 2 specimens; for measurement see Table 1). In life: head, thorax, antennae, apices of tibiae, tarsi, and abdominal markings of the abdomen are pale brown, siphunculi, cauda whitish, eyes reddish. On slide: head, thorax, antennae, clypeus, ultimate rostral segment, apices of tibiae, tarsi, and sclerites of the 3rd–6th abdominal tergites are pale brown. Siphunculi, cauda, legs, genital and anal plates are pale. Frontal groove is not deep. Its depth 0.15–0.16 of the distance between bases of antennae. Antennal tubercles are distinct and divergent. Median frontal tubercle is absent. Cephalic hairs are short, slightly capitate. Antennae are six-segmented. The first antennal segment has a small protuberance on the inner side and bears 4 hairs. Numbers of hairs on 2nd–6th antennal segments are II—3, III—6–10, IV—5–6, V—3–5, VI–5. Number of the secondary rhinaria on the 3rd–5th antennal segments: 20–23, 9, and 2–3. Hairs on the 3rd segment are very short, slightly capitate. Rostrum reaches beyond the base of the hind coxae. Its ultimate rostral segment is long, and slender. Siphunculi are slightly swollen, with small distinct flanges. Cauda is bluntly triangular. Abdomen has transversal sclerotic bar on each of the 3rd–6th abdominal tergites. Dorsal hairs on the 2nd–5th tergites are slightly capitate. Legs are long. Hairs on the hind tibia are slightly capitate, 0.7 of its width in the midlength. First tarsal segments with 3:3:3 setae.

Biology. This aphid lives on the undersides of leaves of *Phlomis salicifolia* Regel (Lamiaceae). It is not attended by ants. The life cycle is unknown.

Taxonomical notes. The new species resembles *C.* (*Cryptomyzus*) *heinzei* Hille Ris Lambers and *C.* (*Cryptomyzus*) *behboudii* Remaudière et Davatchi in having a long ultimate rostral segment which in apterae is not less than 1.8 times longer than the second segment of hind tarsus (not more than 1.5 times in all species). Apterae of *Cryptomyzus sairamugamicus* **sp. n.** differ from those of *C. heinzei* in having fewer secondary rhinaria on 3rd antennal segment (0–2 versus 6–8), smaller ratio of 4th antennal segment to 5th antennal segment (0.86–0.97 in comparison with 1.05–1.10), and shorter hairs on 3rd antennal segment (longest hairs 0.5–0.8 of length of base of 6th antennal segment compared with 0.9–1.0 in *C. heinzi*). Apterae of the new species differ from those of *C. behboudii* (which is also described from a species of *Phlomis*) in the ratios of ultimate rostral segment to second segment of hind tarsus (1.8–2.0 versus 2.7–3.0 in *C. behboudii*), ultimate rostral segment to base of 6th antennal segment (1.4–1.6 in comparison with 2.8–3.3), of siphunculi to cauda length (3.7–5.0 against 2.9–3.5), of siphunculi to body length (0.23–0.30 and 0.17–0.20), and of second segment of hind tarsus to base of 6th antennal segment (0.75–0.85 versus 1.0–1.1).

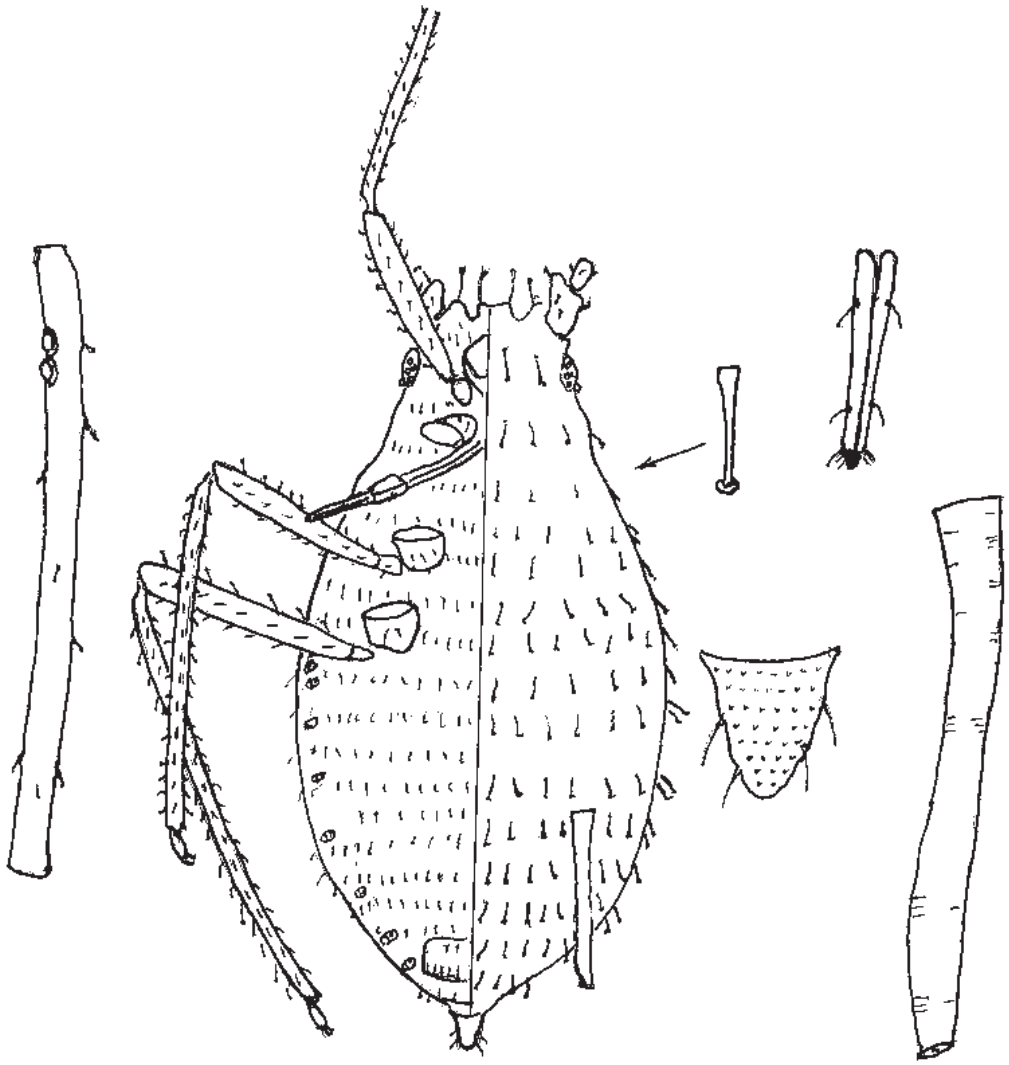

FIGURE 1. *Cryptomyzus sairamugamicus* **sp. n.**: a—body; b—third antennal segments; c—ultimate rostral segment; d—dorsal hair; e—siphunculus; f—cauda.

***Cryptomyzus karzhantavicus* sp. n.**
(Fig. 2, Table 1)

Type material. Holotype: apterous viviparous female, slide no 5041, South Kazakhstan, West Tien Shan, Sairam-Ugam natural park, Karzhantau gorge, Kyrykkyz pass, H- 1861 m a.s.l., *Stachys betonicifolia*, 9.08.2014, R. Kadyrbekov (Institute of Zoology, Almaty, Kazakhstan). Paratypes—9 apterous viviparous females, same place and date (Institute of Zoology, Almaty, Kazakhstan).

Etymology. The new species is named after Karzhantau gorge, where it was collected.

Apterous viviparous female (from 10 specimens; for measurement see Table 1). In life: body white with green markings, eyes are reddish. On slide: body and appendages pale without dark parts. Body is elliptic (fig. 2 a). Frontal groove is middle deep. Its depth 0.18–0.25 of the distance between bases of antennae. Antennal tubercles are

distinct and divergent. Median frontal tubercle is well developed, quadrate (fig. 2 a). Cephalic hairs are long, with thick bases and capitate apices. Antennae are six-segmented; first segment has a large protuberance on inner side and bears 4 short hairs. Number of hairs on 2nd–6th antennal segments are II—3–4, III—6–10, IV—5–6, V—4–5, VI—5–6. Basal parts of 3rd and 4th antennal segments with respectively 4–12 and 0–2 secondary rhinaria (fig. 2 b). Hairs on the 3rd segment are short, slightly capitate.

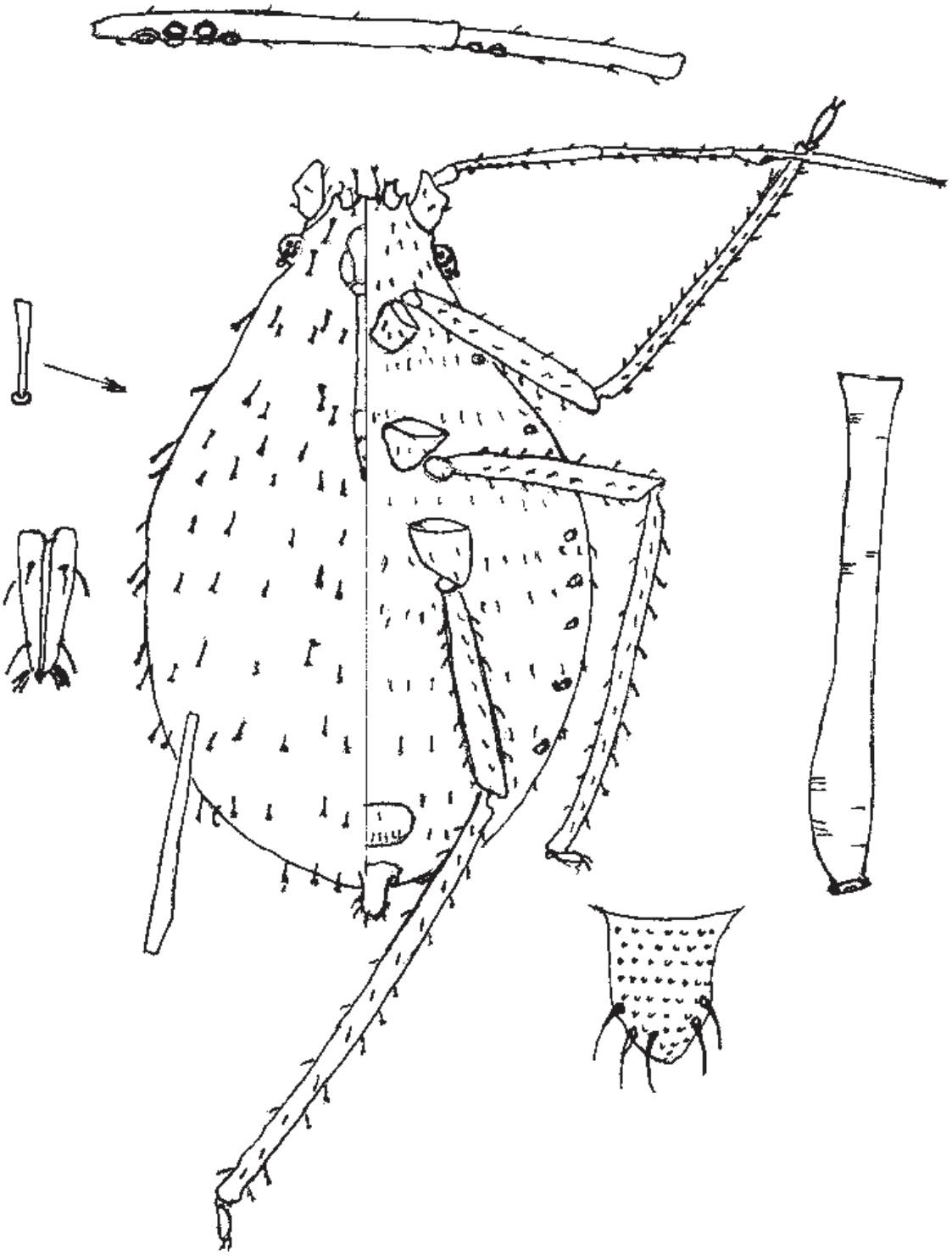

FIGURE 2. *Cryptomyzus karzhantavicus* **sp. n.**: a—body; b—Third and 4th antennal segments; c—ultimate rostral segment; d—siphunculus; e—dorsal hair; f—cauda.

TABLE 1. Measurements of *Cryptomyzus karzhantavicus* sp.n. and *C. sairamugamicus* **sp. n.** (The following abbreviations are used: BL—body length with cauda, ANT—total antennae length, ANT III—length of 3rd antennal segment, ANT IV—length of 4th antennal segment, ANT V—length of 5th antennal segment, ANT VIb—length of base of sixth antennal segment, ANT IIIbd—basal diameter of 3rd antennal segment, PT—length of processus terminalis, HW—width of head across eyes, URS—length of ultimate rostral segment, SIPH—siphunculus length, CAUDA—cauda length, HFEM—hind femur length, HTIB—hind tibia length, HT II—length of 2nd segment of hind tarsus, Longest hair on ANT III—hair length, ABD TERG III—3rd abdominal tergite, ABD TERG VIII—8th abdominal tergite, ANT/BL—length of antennae to body length with cauda, PT/ANT VI b—length of processus terminalis to length of base of sixth antennal segment, PT/ANT III –length of processus terminalis to length of 3rd antennal segment, PT/HW—length of processus terminalis to width of head across eyes, ANT III/BL—length of 3rd antennal segment to body length with cauda, ANT III/SIPH—length of 3rd antennal segment to siphunculus length, ANT III/ANT IV—length of 3rd antennal segment to length of 4th antennal segment, ANT III/ANT VI—length of 3rd antennal segment to length of 6th antennal segment, ANT III/PT—length of 3rd antennal segment to length of processus terminalis, ANT VIb/ANT III—length of base of sixth antennal segment to length of 3rd antennal segment, Longest hair on ANT III/ANT IIIbd—longest hair on ANT III to basal diameter of 3rd antennal segment, Cephalic frontal hair/–ANT IIIbd—cephalic frontal hair to basal diameter of 3rd antennal segment, Longest hair on ABD TERG III/–ANT IIIbd—longest hair on ABD TERG III to basal diameter of 3rd antennal segment, Longest hair on ABD TERG VIII/–ANT IIIbd—longest hair on ABD TERG VIII to basal diameter of 3rd antennal segment, URS/its basal width—length of ultimate rostral segment to its basal width, URS/–ANT VIb—length of ultimate rostral segment to length of base of sixth antennal segment, URS/HW—length of ultimate rostral segment to width of head across eyes, URS/HT II—length of ultimate rostral segment to length of 2nd segment of hind tarsus, URS/SIPH—length of ultimate rostral segment to siphunculus length, HFEM/BL—hind femur length to body length with cauda, HFEM/HW—hind femur length to width of head across eyes, HTIB/BL—hind tibia length to body length with cauda, HTIB/HW—hind tibia length to width of head across eyes, H II/ANT VIb—length of 2nd segment of hind tarsus to length of base of sixth antennal segment, SIPH/BL—siphunculus length to body length with cauda, SIPH/HW—siphunculus length to width of head across eyes, SIPH/CAUDA—siphunculus length to cauda length, SIPH/URS—siphunculus length to length of ultimate rostral segment, SIPH/ANT VIb—siphunculus length to length of base of sixth antennal segment, SIPH/HT II—siphunculus length to length of 2nd segment of hind tarsus, CAUDA/its basal width—cauda length to its basal width, CAUDA/BL—cauda length to body length with cauda, CAUDA/H II—cauda length to length of 2nd segment of hind tarsus. The first antennal segment

Measurements	*C. sajramugamicus* **sp.n.**		*C. karzhantavicus* **sp.n.**
	Apterous viviparous females (n=10)	Alate viviparous females (n=2)	Apterous viviparous females (n=10)
BL	1.31–1.59	1.64–1.69	1.44–1.95
ANT	1.82–2.21	2.26–2.49	1.74–2.24
ANT III	0.36–0.47	0.46–0.54	0.36–0.45
ANT IV	0.24–0.35	0.29–0.33	0.23–0.30
ANT V	0.25–0.36	0.31–0.33	0.26–0.35
ANT VIb	0.09–0.11	0.10–0.12	0.10–0.13
ANT IIIbd	0.030–0.035	0.030–0.035	0.029–0.036
PT	0.62–0.90	0.91–0.96	0.61–0.90
Longest hair on ANT III	0.011–0.017	0.009–0.011	0.011–0.017
Longest frontal hair	0.05–0.07	0.020–0.023	0.058–0.075
HW	0.44–0.52	0.48–0.50	0.31–0.52
URS	0.15–0.16	0.15–0.16	0.12–0.13
Width of URS	0.035–0.046	0.046	0.034–0.058
HFEM	0.55–0.62	0.73	0.52–0.82
HTIB	1.05–1.28	1.43	0.92–1.54
HT II	0.081–0.092	0.090–0.092	0.09–0.10

.....continued on the next page

TABLE 1. (Continued)

Measurements	*C. sajramugamicus* **sp.n.**		*C. karzhantavicus* **sp.n.**
	Apterous viviparous females (n=10)	Alate viviparous females (n=2)	Apterous viviparous females (n=10)
Longest hair on ABD TERG III	0.07–0.09	0.025–0.029	0.08–0.10
Longest hair on ABD TERG VIII	0.07–0.09	0.030–0.034	0.10
SIPH	0.33–0.45	0.37–0.49	0.51–0.62
CAUDA	0.08–0.10	0.06–0.10	0.09–0.12
Basal width of cauda	0.100–0.115	0.115–0.127	0.07–0.12
Ratios:			
ANT/BL	1.25–1.53	1.38–1.47	1.00–1.24
PT/ANT VIb	7–9	7.6–8.7	5.8–8.2
PT/ANT III	1.59–2.32	1.77–2.00	1.6–2.1
PT/HW	1.41–1.89	1.90–1.96	1.73–1.97
ANT III/BL	0.25–0.32	0.28–0.32	0.19–0.25
ANT III/SIPH	0.89–1.26	1.21–1.39	0.62–0.80
ANT III/ANT IV	1.31–1.83	1.53–1.64	1.37–1.80
ANT III/ANT VI	0.40–0.55	0.45–0.50	0.43–0.54
ANT III/PT	0.45–0.62	0.50–0.56	0.48–0.62
ANT VIb/ANT III	0.21–0.27	0.19–0.26	0.24–0.33
Longest hair on ANT III/ANT III BD	0.7–0.8	0.3–0.4	0.4–0.5
Cephalic frontal hair/–ANT III BD	1.8–3.0	0.9–1.0	2.5–3.5
Longest hair on ABD TERG III/–ANT IIIbd	3.0–3.7	1.1–1.3	3.5–4.5
Longest hair on ABD TERG VIII/–ANT IIIbd	3.2–3.8	1.3–1.4	2.9–3.3
URS/its basal width	3.9–4.7	4.34	2.60–3.03
URS/–ANT VIb	1.45–1.77	1.25–1.60	0.92–1.27
URS/HW	0.35–0.43	0.40	0.30–0.33
URS/HT II	1.8–2.0	1.6–1.8	1.25–1.40
URS/SIPH	0.34–0.48	0.39–0.42	0.20–0.24
HFEM/BL	0.28–0.35	0.37	0.28–0.38
HFEM/HW	1.11–1.32	1.52	1.31–1.81
HTIB/BL	0.60–0.69	0.72	0.60–0.68
HTIB/HW	2.15–2.78	2.98	2.70–3.26
H II/ANT VIb	0.73–1.00	0.77–0.90	0.7–1.0
SIPH/BL	0.23–0.30	0.22–0.23	0.30–0.35
SIPH/HW	0.75–0.89	0.76–0.79	1.43–1.68
SIPH/CAUDA	3.7–5.0	4.0–5.3	5.1–6.5
SIPH/ANT VIb	3.2–4.5	3.2–3.8	4.2–5.9
SIPH/URS	2.06–2.93	2.38–2.53	4.25–4.88
SIPH/HT II	4.38–5.63	4.10–4.33	5.1–6.6
Maximal width of siphunculus to its minimal width	1.2–1.4	1.3–1.5	1.45–1.70
CAUDA/its basal width	0.88–1.00	0.72–1.09	1.0–1.2
CAUDA/BL	0.05–0.07	0.04–0.06	0.05–0.07
CAUDA/H II	1.00–1.25	0.7–1.1	1.0–1.2

Rostrum reaches beyond the bases of the hind coxae. Its ultimate rostral segment is wedge-shaped (fig 2 c) and bears 4–6 accessory hairs. Siphunculi are slightly swollen, with small distinct flanges (fig. 2 d). Cauda is blunt triangular or helmet-shaped (fig 2 f) and bears 5–7 hairs. Dorsal hairs on the 2nd–5th abdominal tergites are capitate (fig. 2 e). Marginal tubercles are absent. Number of hairs on abdominal tergites: II–V—10–12, VIII—4–6. Genital plate is broadly oval, with 2–4 discal hairs and 10–11 posterior hairs. Legs are long (fig. 2 a). Hairs on the hind tibiae are slightly capitate, and 0.65–0.75 of its width at midlength. First tarsal segments with 3:3:3 setae.

Biology. This aphid lives on undersides of leaves of *Betonica betonicifolia* (Rupr., O. Fedtsch. et B. Fedtsch.) Sennikov (Lamiaceae). It is not attended by ants. Other morphs and life cycle are unknown.

Taxonomical notes. The new species together with *C.* (*Cryptomyzus*) *taoi* Hille Ris Lambers differs from all other species of the nominative subgenus by its relatively very long siphunculi (more than 5 times longer than cauda, whereas they are not more 4.5 times cauda in other species). *Cryptomyzus* (*Cryptomyzus*) *karzhantavicus* **sp. n.** differs from *C.* (*Cryptomyzus*) *taoi* in the ratios of 3rd antennal segment to 6th antennal segment (0.43–0.54 against 0.57–0.59), of processus terminalis to the base of 6th antennal segment (5.8–8.2 in comparison with 9.0–9.1), of siphunculi to cauda length (5.1–6.5 versus 5.0–5.1), of siphunculi to the body length (0.30–0.35 as opposed to 0.20–0.25) and number of accessory hairs on the ultimate rostral segment (4–6 versus 7–9).

Key to the apterous viviparous females of the genus *Cryptomyzus* Oestlund, 1922

(*Cryptomyzus elshotze* Bhattacharya et Dey, 2001 and *Cryptomyzus michaelseni* (Schouteden, 1904) are not included in the key. The first species is described from fundatrix, the second species is described from the larva of the last instar).

1 Hairs on abdominal tergites I–IV, and on median frontal and antennal tubercles shorter than the diameter of base of 3rd antennal segment, inconspicuously capitate. Alternates between *Ribes rubrum* L. and *Galeopsis*, *Stachys, Lamium*. Norway, Sweden, Poland, Lithuania (Basilova, 2010; Basilova & Rakauskas, 2007), Russia (West Siberia) . . . . . *C.* (*Ampullosiphon*) *stachydis* (Heikinheimo, 1955)

- Hairs on abdominal tergites I–IV, and on median frontal and antennal tubercles usually much longer than the diameter of base of 3rd antennal segment, either on thick bases and capitate, or needle shaped 2

2 Hairs on abdominal tergites I-IV and median frontal and antennal tubercles long and needle shaped. Siphunculi without distinct flanges. 3

- Hairs on abdominal tergites I–IV, median frontal and antennal tubercles capitate. Siphunculi with distinct flanges 4

3 Median frontal tubercle absent. Processus terminalis 7.0–7.5 times base of 6th antennal segment. Third antennal segment with about 3 secondary rhinaria. Ultimate rostral segment about 1.5 times longer than second segment of hind tarsus. 3rd–5th abdominal tergites each with 12–16 hairs. On *Phlomis canescens* Regel. Tadzhikistan . . . . . *C. (Phlomimyzus) tadzhikistanicus* Narzikulov et Daniyarova, 1979

- Median frontal tubercle developed. Processus terminalis 7.5–9.5 times base of 6th antennal segment. Third antennal segment with 7–19 secondary rhinaria. Ultimate rostral segment 1.0–1.1 of length of second segment of hind tarsus. 3rd–5th abdominal tergites each with 18–27 hairs. On *Leonurus turkestanicus* V. I. Krecz. & Kuprian. and occasionally *Lamium album* L.. Kazakhstan . . . . . *C. (P.) multipilosus* Kadyrbekov, 2000

4 Secondary rhinaria occur on 3rd–4th and sometimes on 5th antennal segments. Dark medial pleural, and marginal sclerites developed on all abdominal tergites. Siphunculi dark brown, cylindrical with large flanges. Cauda trapezium-shaped. Alternates between *Ribes saxatile* Pall. and *Eriophyton lamiiflorum* (Rupr.) Bräuchler. Kazakhstan . . . . . *C.* (*Alataumyzus*) *malkovskii* Kadyrbekov, 1993

- Secondary rhinaria occur only on 3rd–4th antennal segments. Dark medial pleural, and marginal sclerites absent from all abdominal tergites. Siphunculi pale, cylindrical or swollen, with small flanges. Cauda bluntly triangular or helmet-shaped 5

5 Longest hairs on 3rd antennal segment usually shorter than (or equal to) its basal diameter and shorter than the hairs on 1st antennal segment 6

- Longest hairs on 3rd antennal segment longer than its basal diameter, about the same length as those on 1st antennal segment 13

6 Ultimate rostral segment not less than 1.8 times the second segment of hind tarsus 7

- Ultimate rostral segment not more than 1.7 times the second segment of hind tarsus. 9

7 Third antennal segment with 0–2 secondary rhinaria. Fourth antennal segment shorter than fifth antennal segment. Longest hairs on 3rd antennal segment 0.5–0.8 of length of base of 6th antennal segment. On *Phlomis*. Asia. 8

- Third antennal segment with 6–8 secondary rhinaria. Fourth antennal segment longer than fifth antennal segment. Longest hairs of 3rd antennal segment 0.9–1.0 of length of base of 6th antennal segment. Alternates between *Ribes alpinum* L. and *Clinopodium vulgare* L., *Betonica officinalis* L.. Spain, Germany, Czech Republic, Hungary . . . . . *C.* (*Cryptomyzus*) *heinzei* Hille Ris Lambers, 1953

8 Ultimate rostral segment 2.7–3.0 times second segment of hind tarsus and 2.8–3.3 times base of 6th antennal segment. Siphunculi 2.9–3.5 times longer than cauda and 0.17–0.20 of body length. Second segment of hind tarsus 1.0–1.1 of base of 6th anten-

nal segment. On *Phlomis olivieri* Benth. Iran, Turkey . . . . . *C.* (*C.*) *behboudii* Remaudière et Davatchi, 1961

- Ultimate rostral segment 1.8–2.0 times second segment of hind tarsus and 1.4–1.6 times base of 6th antennal segment. Siphunculi 3.7–5.0 times longer than cauda and 0.23–0.30 of body length. Second segment of hind tarsus 0.75–0.85 of base of 6th antennal segment. On *Phlomis salicifolia* Regel. Kazakhstan . . . . . *C.* (C.) *sairamugamicus* **sp. n.**

9 Siphunculi approximately cylindrical. 9

- Siphunculi distinctly swollen 10

9 Third antennal segment 0.46–0.53 of 6th antennal segment with 0–7 secondary rhinaria. Processus terminalis 8.8–10.5 times base of 6th antennal segment. Siphunculi 2.5–3.1 longer than cauda and 0.20–0.24 of body length. Alternates between *Ribes* and *Stachys*. Europe, Lebanon, Turkey, Georgia, Armenia, Tajikistan, Uzbekistan, Kyrgyzstan, Kazakhstan, Russia (to Far East), Korea, China, Japan, USA (adventive), Canada (adventive), Mexico (adventive) . . . . . *C.* (*C.*) *ribis* (Linnaeus, 1758)

- Third antennal segment 0.68–0.76 of 6th antennal segment with 10–37 secondary rhinaria. Processus terminalis 6.3–7.3 times base of 6th antennal segment. Siphunculi 2.0–2.3 longer than cauda and 0.16–0.18 of body length. On *Scutellaria.* Kazakhstan . . . . . *C.* (*C.*) *alatavicus* Kadyrbekov, 1993

10 Siphunculi not more 4.5 times cauda. Ultimate rostral segment with not less than 9 accessory hairs 11

- Siphunculi not less 5 times cauda. Ultimate rostral segment with not more than 9 accessory hairs 12

11 Third antennal segment 0.45–0.55 of 6th antennal segment. Processus terminalis 8.0–10.5 times base of 6th antennal segment. 3rd–5th abdominal tergites with 12–18 hairs. Alternates between *Ribes alpinum* L.*, R. heterotrichum* C.A. Mey.*, R.* sp. and *Stachys*. Europe, Russia (European part), Tajikistan, Uzbekistan, Kazakhstan, Argentina (adventive) . . . . . *C.* (*C.*) *korschelti* Börner, 1938

- Third antennal segment 0.59–0.67 of 6th antennal segment. Processus terminalis 6.0–8.5 times base of 6th antennal segment. 3rd–5th abdominal tergites with 6–8 hairs. On *Ballota nigra* L. and occasionally *Lamium album* L. Great Britain, France, Netherlands, Spain, Italy, Cyprus, Czech Republic, Bulgaria, Iran, Pakistan, Argentina (adventive), Chile (adventive). . . . . *C.* (*C.*) *ballotae* Hille Ris Lambers, 1953

12 Third antennal segment 0.43–0.54 of 6th antennal segment. Processus terminalis 5.8–8.2 times base of 6th antennal segment. Ultimate rostral segment with 4–6 accessory hairs. Siphunculi 5.1–6.5 times longer than cauda and 0.30–0.35 of body length. On *Betonica betonicifolia* (Rupr. Ex O. Fedtsch. & B. Fedtsch.) Sennikov. Kazakhstan . . . . . *C.* (*C.*) *karzhantavicus* **sp. n.**

- Third antennal segment 0.57–0.59 of 6th antennal segment. Processus terminalis 9.0–9.1 times base of 6th antennal segment. Ultimate rostral segment with 7–9 accessory hairs. Siphunculi 5.0–5.1 times longer than cauda and 0.20–0.25 of body length. On *Marrubium supinum* L.*, Lamium, Leonurus sibiricus* L., *Phlomoides bracteosa* (Royle ex Benth) Kamelin & Makhm. Pakistan, India, Mongolia, Russia (Far East), China, Korea, Japan . . . . . *C.* (*C.*) *taoi* Hille Ris Lambers, 1963

13 Abdominal tergites I–IV each with 12–20 hairs. 14

- Abdominal tergites I–IV each with 5–14 hairs. 16

14 Third antennal segment with 1–4 secondary rhinaria. Ultimate rostral segment with 6 accessory hairs. On *Eriophyton*. Kazakhstan . . . . . *C.* (*C.*) *transiliensis* Kadyrbekov, 1993

- Third antennal segment with more than 5 secondary rhinaria. Ultimate rostral segment with not more than 4 accessory hairs 15

15 Third antennal segment with 11–22 secondary rhinaria. Ultimate rostral segment 1.4–1.5 times second segment of hind tarsus. Siphunculi 1.5–2.1 times longer than cauda. Processus terminalis less than 9 times base of 6th antennal segment. On *Leonurus cardiaca* L. Czech Republic, Poland, Lithuania, Belarus, Ukraine, Russia. . . . . *C.* (*C.*) *leonuri* Bozhko, 1961

- Third antennal segment with 5–15 secondary rhinaria. Ultimate rostral segment 1.2 times second segment of hind tarsus. Siphunculi 1.0–1.5 times longer than cauda. Processus terminalis 10.1–11.0 times base of 6th antennal segment. On *Lamium album* L. Great Britain, France, Belgium, Netherlands, Denmark, Norway, Sweden, Germany, Switzerland, Czech Republic, Poland, Latvia, Lithuania, Moldova, Russia (to West Siberia), Kazakhstan. . . . . *C.* (*C.*) *alboapicalis* (Theobald, 1916)

16 Siphunculi 0.12–0.15 of body length. On *Lamium maculatum* L. Belgium, Netherlands, Germany, Austria, Czech Republic, Hungary, Lithuania . . . . . *C.* (*C.*) *ulmeri* (Börner, 1952)

- Siphunculi more than 0.15 of body length 17

17 Rostrum extending backward to hind coxae. Abdominal tergites I–IV each with 8–14 hairs. Siphunculi always swollen. Alternates between *Ribes rubrum* L. and *Galeobdolon luteum* L. England, Netherlands, Germany, Czech Republic, Italy, Lithuania (Basilova, 2010; Basilova & Rakauskas, 2007) . . . . . *C.* (*C.*) *maudamanti* Guldemond, 1990

- Rostrum shorter. Abdominal tergites I–IV each with 4–11 hairs. Siphunculi sometimes not swollen. Alternates between *Ribes nigrum* L.*, R. rubrum* L. and *Galeopsis*. Europe, Georgia, Russia (to Far East), Kazakhstan, USA (introduced), Canada (introduced) . . . . . *C.* (*C.*) *galeopsidis* (Kaltenbach, 1843) complex

Key to the alate viviparous females of the genus *Cryptomyzus* Oestlund, 1922

(*Cryptomyzus karzhantavicus, C. leonuri* and *C. transiliensis* are not included in the key.)

1 Primary rhinarium on 5th antennal segment much larger than secondary rhinaria, at least 1.5 times longer than the remaining part of this segment distal to rhinarium . . . . . *C.* (*Ampullosiphon*) *stachydis*

- Primary rhinarium on 5th antennal segment about the same size of secondary rhinaria, at most equal in length to the remaining part of this segment distal to rhinarium 2

2 Hairs on abdominal tergites I–IV, and on median frontal and antennal tubercles, needle shaped. Siphunculi without distinct flanges. 3

- Hairs on abdominal tergites I–IV, and on median frontal and antennal tubercles, capitate. Siphunculi with distinct flanges. . . 4
3 Third and 4th antennal segments respectively with about 29, and about 2 secondary rhinaria. Ultimate rostral segment about 1.5 times second segment of hind tarsus . . . . . *C. (Phlomimyzus) tadzhikistanicus*
- Third, 4th, and 5th antennal segments respectively with 36–37, 13–14, and 0–2 secondary rhinaria. Ultimate rostral segment 1.0–1.1 times second segment of hind tarsus . . . . . *C. (P.) multipilosus*
4 Inner protuberance on 1st antennal segment inconspicuous. Ultimate rostral segment stocky, 1.0–1.1 times second segment of hind tarsus. Siphunculi cylindrical with large flanges. Cauda trapezium-shaped . . . . . *C.* (*Alataumyzus*) *malkovskii*
- Inner protuberance on 1st antennal segment well developed. Ultimate rostral segment more slender and more than 1.2 times second segment of hind tarsus (except in *C. galeopsidis*). Siphunculi swollen or cylindrical with small flanges 5
5 Ultimate rostral segment more than 1.6 times second segment of hind tarsus. 6
- Ultimate rostral segment not more than 1.5 times second segment of hind tarsus 8
6 Third and 4th antennal segments with no more than 23 and 9 secondary rhinaria. Fourth antennal segment shorter than fifth antennal segment 7
- Third and 4th antennal segments respectively with 30–46 and 14–20 secondary rhinaria. Fourth antennal segment longer than fifth antennal segment . . . . . *C.* (*C.*) *heinzei*
7 Third, 4th, and 5th antennal segments respectively with 10–11, 3–5 and 0 secondary rhinaria. Ultimate rostral segment about 2.6 times second segment of hind tarsus . . . . . *C.* (*C.*) *behboudii*
- Third, 4th, and 5th antennal segments respectively with 20–23, 9 and 2–3 secondary rhinaria. Ultimate rostral segment 1.6–1.8 times second segment of hind tarsus . . . . . *C.* (*C.*) *sairamugamicus* **sp. n.**
8 Siphunculi approximately cylindrical. 9
- Siphunculi distinctly swollen 10
9 Third antennal segment about 0.45 of 6th antennal segment. Third, 4th and 5th antennal segments respectively with 30–47, 12–27, 1–10 secondary rhinaria. Processus terminalis 10.0–10.5 times base of 6th antennal segment. Siphunculi 2.3–3.1 times of cauda length and 0.16–0.20 of body length . . . . . *C.* (*C.*) *ribis*
- Third antennal segment 0.72–0.76 of 6th antennal segment. Third, 4th and 5th antennal segments respectively with 68–82, 24–28 and 3–6 secondary rhinaria. Processus terminalis 6.6–6.8 times base of 6th antennal segment. Siphunculi 1.90–1.93 times cauda length and 0.14–0.15 of body length . . . . . *C.* (*C.*) *alatavicus*
10 Siphunculi not more than 4.5 times cauda length. 11
- Siphunculi more than 5 times cauda length . . . . . *C.* (*C.*) *taoi*
11 Siphunculi less than 0.15 of body length 12
- Siphunculi more than 0.15 of body length 13
12 Siphunculi 0.09–0.11 of body length. Third, 4th and 5th antennal segments respectively with 22–38, 14–23 and 0–7 secondary rhinaria . . . . . *C.* (*C.*) *alboapicalis*
- Siphunculi 0.12–0.14 of body length. Third, 4th and 5th antennal segments respectively with 15–28, 6–11 and 0–5 secondary rhinaria . . . . . *C.* (*C.*) *ulmeri*
13 Ultimate rostral segment not less than 1.45 times second segment of hind tarsus. Siphunculi not less than 3.5 times cauda length and not less than 0.20 of body length. 14
- Ultimate rostral segment not more 1.40 times second segment of hind tarsus. Siphunculi not more than 2.0 times the cauda length and not more that 0.18 of body length. 15
14 Third antennal segment 0.54–0.56 of 6th antennal segment. Processus terminalis 9.5–9.7 times base of 6th antennal segment . . . . . *C.* (*C.*) *korschelti*
- Third antennal segment 0.65–0.67 of 6th antennal segment. Processus terminalis 7.7–7.9 times base of 6th antennal segment . . . . . *C.* (*C.*) *ballotae*
15 Number of hairs on each of abdominal tergites II-IV 9–14. Third antennal segment with 26–45 secondary rhinaria. Siphunculi 0.47–0.55 of length 3rd antennal segment. Ultimate rostral segment 1.15–1.40 times second segment of hind tarsus . . . . . *C.* (*C.*) *maudamanti*
- Number of hairs on each of abdominal tergites II–IV 7–11. Third antennal segment with 25–66 secondary rhinaria. Siphunculi 0.31–0.47 of length 3rd antennal segment. Ultimate rostral segment 0.95–1.15 times second segment of hind tarsus 3rd. . . . . *C.* (*C.*) *galeopsidis* complex

Acknowledgments

I thank my reviewers for valuable comments and advice that were useful in preparing the manuscript for publication. Special thanks to Dr. Roger Blackman who helped me with additional material to the article and with the manuscript proof.

References

Basilova, J. & Rakauskas, R. (2007) The genus *Cryptomyzus* (Hemiptera, Sternorrhyncha: Aphididae) in Lithuania: the species list, biology, and distribution. *Acta Zoologica Lithuanica*, 17 (4), 263–271.

https://doi.org/10.1080/13921657.2007.10512842
Basilova, J. (2010) The application of discriminant analysis to identify *Cryptomyzus* aphids. *Žemdirbysté=Agriculture*, 97 (4), 99–106.
Blackman, R.L. (2010) Aphids—Aphidinae (Macrosiphini). *Handbooks for the identification of British Insects*, 2 (7), 1–413.
Blackman, R.L. & Eastop, V.F. (2006) *Aphids on the World's Herbaceous Plants and Shrubs*. *Vol. 1–2*. Wiley, London, 1439 pp. Updated version. Available from: http://www.aphidsonworldsplants.info (accessed 29 September 2020)
Bozhko, M.P. (1961) New aphid genus and new species (Homoptera, Aphidoidea) from the South of Ukraine, Moldova and North Caucasus. *Horae Societatis Entomologicae Rossicae,* 48, 5–37. [in Russian]
Börner, C. (1952) *Europa centralis Aphides Die Blattläuse Mitteleuropas. Mitteilungen des Thüringischen Botanischen Gesellschaft. Beiheft 3*. Knabe, Weimar, 488 pp.
Favret, C. (2019) *Aphid Species File*. Version 5.0/5.0. Available from: http://Aphid.Species.File.org (accessed 23 November 2020)
Guldemond, J.A. (1990) *On Aphids, their Host Plants and Speciation (a biosystematic study of the genus Cryptomyzus)*. Ph.D. Thesis, Landbouwuniversiteit, Wageningen, 160 pp.
Heikinheimo, O. (1955) A new aphid species *Amphorophora* (*Ampullosiphon* subgen. n.) *stachydis* sp. n. (Hom., Aphididae) from Finland. *Annales Entomologici Fennici*, 21, 1, 5–8.
Hille Ris Lambers, D. (1953) Contributions to a Monograph of the Aphididae of Europe. *Temminckia*, 9. 1–175.
Hille Ris Lambers, D. (1965) On some Japanese Aphididae (Homoptera). *Tijdchrift voor Entomologie*, 108 (7), 189–203.
Kadyrbekov, R. Kh. (1993) Review of the aphids of *Cryptomyzus* genus (Homoptera, Aphididae) of Kazakhstan fauna with description three new species. *Zoological journal*, 72 (1), 44–53. [in Russian]
Kadyrbekov, R. Kh. (2000) New aphids species of Macrosiphini tribe (Homoptera, Aphididae) from South-East Kazakhstan. *Selevinia*, 1–4, 9–17. [in Russian]
Kadyrbekov, R. (2014) Aphids (Homoptera, Aphidoidea) of the mountains of Kazakhstan. *Saarbrücken*, LAP, 442 pp.
Narzikulov, M.N. & Daniyarova, M.M. (1979) New aphids species from *Cryptomyzus* Oestl., 1922 (Homoptera, Aphididae) from Tajikistan. *Synopsis of USSR Entomological Society*, 1961, 42–44. [in Russian]
POWO (2019) Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet. Available from: http://plantsoftheworldonline.org/ (accessed 23 November 2020).
Remaudière, G. & Davatchi, A. (1961) Un *Cryptomyzus* (Hom. Aphidoidea) nouveau de l'Iran. *Revue de Pathologie Végétale et d'Entomologie agricole de France*, XL (1), 3–11.